CLAIMS

WE CLAIM:

1. A microelectromechanical system (MEMS) with reduced noise sensitivity, comprising:

a substrate;

a first element supported from the substrate for movement between first and second positions with respect to an axis relative to the substrate;

a first actuator attached to the first element to exert a force thereupon dependent upon a parameter to be measured and urging the element toward the second position;

a second element supported from the substrate for movement between the first and second positions with respect to the axis relative to the substrate, and

a sensor assembly communicating with the first and second elements to detect movement of the first and second elements and to provide an output subtracting measurement of movement of the first and second elements so as to provide an output with reduced influence from common mode noise acting to move the first and second elements.

2. The MEMS device of claim 1 including further a second actuator attached to the second element but not communicating with the parameter to be measured to not exert a force thereupon dependant upon the parameter to be measured.

3. The MEMS device of claim 1 including further a second actuator attached to the second element to exert a force thereupon dependant upon the parameter to be measured and urging the element toward the first position.

4. The MEMS device of claim 1wherein the parameter is an electrical signal and wherein the first and second actuators receive input electrical signals related to the parameter and exert a force dependant on the input electrical signal.

5. The MEMS device of claim 1 further including an input circuit receiving the input electrical signal and producing a first input electrical signal for the first actuator and a second input electrical signal for the second actuator wherein the first input electrical signal is inverted with respect to the second electrical signal.

6. The MEMS device of claim 1 wherein the second element is not connected to an actuator exerting a force thereupon dependant upon the parameter to be measured and wherein the sensor assembly subtracts the sensed position of the second element from the sensed position of the first element to provide the output.

7. The MEMS device of claim 1 wherein the sensor assembly subtracts the sensed position of the second element indicating the inverted parameter plus the effects of substrate acceleration from the sensed position of the first element indicating the noninverted parameter plus effects of substrate acceleration to provide the output.

8. The MEMS device of claim 1 wherein the first and second actuators are selected from the group consisting of: an electrostatic motor, a Lorenz force motor, a piezoelectric motor, a thermal-expansion motor, and a mechanical-displacement motor.

9. The MEMS device of claim 1 wherein the sensor assembly includes sensors to detect movement of the first and second elements selected from the group consisting of capacitive sensors, piezoelectric sensors, photoelectric sensors, resistive sensors, and optical switching sensors.

10. The MEMS device of claim 1 wherein the first and second elements are beams attached to the substrate for sliding motion along an axis parallel to an adjacent surface of substrate.

11. The MEMS device of claim 1 wherein the first and second actuators are connected in opposite directions to the first and second beams.

12. The MEMS device of claim 1 wherein the sensor assembly includes capacitors attached to the first and second beams so as to provide an opposite change in capacitance for corresponding capacitors of the first and second beams.

13. The MEMS device of claim 8 wherein the beams move with respect to the substrate along a longitudinal axis and including flexing transverse arm pairs attached at longitudinally opposed ends of the beam to extend outward therefrom to support the beam with respect to the substrate.

14. The MEMS device of claim 1 further including:

a first control element attached to the first element to exert a force dependent on the displacement of the first element toward the first position; and

a second control element attached to the second element to exert a force dependent on the displacement of the first element toward the first position.

15. The MEMS device of claim 1 further including:

a first control element attached to the first element to exert a predetermined substantially constant force on the first element toward the first position; and

a second control element attached to the second element to exert a predetermined substantially constant force on the first element toward the first position.

16. The MEMS device of claim 1 wherein at least a portion of the first element between the first actuator and the sensor assembly is an electrical insulator to electrically isolate the first actuator from the sensor assembly.